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Inland Waters Directorate
Western and Northern Region

Direction générale des eaux intérieures
Région de l'ouest et du nord

91-03739/

1989-90 SUMMARY REPORT for

the Fourth Year of the Seven-Year Program for the

REVIEW of HYDROMETRIC SURVEY DATA to 1986

for Selected Gauging Stations

in the Northwest Territories

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March 1990

Under Contract With:
Water Resources Branch (NWT Programs)
Inland Waters Directorate
Conservation and Protection
Western and Northern Region
Environment Canada
Yellowknife, NWT

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1. INTRODUCTION

The *purpose* of this contract was to carry out an in-depth review of historical hydrometric survey data for selected gauging stations in the Northwest Territories in order to find and correct *significant errors* in the original computations; and to make recommendations for improving future data collection and computation methods to ensure that *national standards* are maintained.

Prior to 1981, data were collected and computed by the Alberta District, *Calgary* Office (and Fort Smith, Fort Simpson, Norman wells and Inuvik NWT sub-offices) and the Manitoba District, *Winnipeg* Office (and Baker Lake NWT sub-office); and prior to 1967, by the Pacific and Yukon District, *Vancouver* Office (and Whitehorse Yukon sub-office). This responsibility was transferred to the NWT Programs, *Yellowknife* Office in 1981. The *STREAM* computer program for the automated computation of streamflow data has been used since about 1976 and data have been collected and computed in *metric units* since about 1979.

A *pilot project* was carried out in 1986-87 to assess the need for a comprehensive data review program for NWT. The results indicated that the work should be *ongoing* and therefore an overall streamflow data review program was established, starting in 1987-88 and was continued in 1988-89.

In 1989-90, the approach to data review and review progress (especially detailed concerns at specific stations) were discussed with Scott McDonald of the Yellowknife Office either by telephone or through written correspondence, and during two visits to Yellowknife NWT, in August 1989 and January 1990; discussions were also held with other NWT staff including Chris Heron (Yellowknife), Pat Wood (Fort Simpson) and Herb Wood, Moe Hansen, George Lennie and Wade Hanna (Inuvik). A six-day field trip was made in August to nineteen gauging stations near Norman Wells and Inuvik, either by helicopter or truck. This contract was discussed with Arthur Redshaw, Chief, NWT Programs in Yellowknife, regarding project management and with Doug Kirk, Headquarters, on several occasions either by telephone or written correspondence, regarding approval procedures, computer use, procedures for requesting comparison hydrographs, updating temporary data files, submitting revisions, and provision of various plots and listings.

This Summary Report contains a list of the stations for the *overall data review program*; those reviewed to date; those proposed for review during the next three years (which will complete the overall review program); and a brief description of data review procedures and problems encountered. The extent of revisions for 1989-90 is summarized and specific recommendations are made.

Detailed explanations are given in *Review Reports* for each station. Copies of these Reports are available from the Water Resources Branch, NWT Programs, Yellowknife Office.

2. RECOMMENDATIONS

It is recommended that:

2.1. users be warned by an appropriate note under Remarks in the next Historical Streamflow Summary publication that data should be used with discretion (mainly because the stage-discharge relation is unstable and/or is not well-defined in the low-water and/or the high-water range, or because discharges are mostly estimated or not well-defined during break-up) for the following 14 stations:

10JA004	Acasta River below Little Crapeau Lake	(1980-86)
10LC010	Boot Creek near Inuvik	(1981-86)
10LC007	Caribou Creek above Highway No. 8	(1975-86)
10ND001	Hans Creek near Inuvik	(1977-87)
10LD002	Jackfish Creek near Fort Good Hope	(1980-86)
10JB001	Johnny Hoe River above Lac Ste. Therese	(1969-86)
10KC001	Mountain River below Cambrian Creek	(1974-86)
10MC002	Peel River above Fort McPherson	(1969-86)
10LC003	Rengleng River below Highway No. 8	(1972-86)
10HB004	Silverberry River near Little Dal Lake	(1980-86)
10JE001	Sloan River near the Mouth	(1976-86)
10ND002	Trail Valley Creek near Inuvik	(1977-86)
10HA003	Twitya River near the Mouth	(1980-86)
10LA002	Weldon River near the Mouth	(1977-86)

2.2 more discharge measurements be obtained, either by conventional current meter methods or indirect determination, at all active gauging stations reviewed this year, to define the stage-discharge relation and/or the distribution of shift/backwater corrections more accurately, and that:

(a) the presence of slush (if any) be fully documented;
(b) the magnitude of surging when determining the mean water level for the measurement be documented, including any problems in setting the servomanometer;
(c) return levels be run when obtaining water levels; and
(d) more than 20 verticals be used (especially for open-water measurements) to ensure that there is not more than 10% of the total flow in any one panel.

2.3 comprehensive field surveys be carried out for the Arctic Red and Peel Rivers to determine the extent of backwater from the Mackenzie Delta, and to develop and implement the appropriate methodology to improve the reliability of the discharge data.

2.4 the elevation of zero flow be obtained periodically at most stations, especially those with unstable controls, to assist in defining the shape of the low-water range (or extension) of the stage-discharge relation more accurately.

2.5 the Standard Period be changed to "All Year" for all stations in NWT to facilitate the comparison of annual data from station to station.

2.6 computer programs be written (to facilitate historical data review or the annual basin review):

(a) for the graphical and mathematical comparison of daily and/or monthly flows at gauging stations in adjacent basins or at gauging stations in a basin on an upstream to downstream order, including time lag (in days);

(b) for plotting continuous discharge comparison hydrographs with options to select the logarithmic scale in either 3, 4 or 5 cycles; or to select an arithmetic scale for a specific range, e.g., for low-water or winter periods; and

(c) to plot historical daily maximum and minimum air temperatures (and precipitation) at selected sites from AES data files; scale 1 mm = 1 day (366 days - same as discharge hydrographs) and 1 cm = 20°C (precipitation 1 cm = 20 mm with distinction between rain and snow).

2.7 Headquarters conduct annual workshops (staff training) to ensure that national standards are maintained in all aspects of hydrometric work and especially on:

(a) office computation of hydrometric data;

(b) installation, maintenance and operation of servomanometers and Data Collection Platforms;

(c) measurement of discharge using conventional current-meter methods and indirect determination; and

(d) winter discharge measurements, particularly under slush conditions.

3. NWT DATA REVIEW PROGRAM

Listed below are the stations included in the seven-year review program, the period of record to be assessed and notes on the annual progress to date.

Sta. No.	Station Name	Review Period	(Yrs.)	Note
10FB001	Mackenzie River near Fort Providence	61-78	(18)	(CP)E
10GC001	Mackenzie River at Fort Simpson	59-86	(28)	(CP)E
10KA001	Mackenzie River at Norman Wells	62-86	(25)	E
10LC001	Mackenzie River at Arctic Red River	72-86	(15)	E
10LC002	Mackenzie River (East Channel) at Inuvik	73-86	(14)	E
	. Great Slave Lake:			
07TB001	.. Emile River at Outlet of Basler Lake	78-86	(9)	C
07TA001	.. La Martre River below Outlet of Lac La Martre	75-86	(12)	C
	.. Snare River:			
07SA004	... Indin River above Chalco Lake	77-86	(10)	C
07SB009	.. Baker Creek near Yellowknife	68-82	(15)	C
07SB011	... Pocket Lake Outflow near Yellowknife	67-78	(12)	C
	.. Yellowknife River:			
07SB010	... Cameron River below Reid Lake	75-86	(12)	C
07SC002	.. Waldron River near the Mouth	78-86	(9)	C
07RD001	.. Lockhart River at Outlet of Artillery Lake	44-49, 63-86	(30)	F
07RC001	... Thonokied River near the Mouth	80-86	(7)	F
07QB002	.. Snowdrift River at Outlet of Siltaza Lake	77-86	(10)	F
07QD001	.. Taltson River above Porter Lake Outflow	77-86	(10)	E
07QA001	.. Taltson River at Outlet of Tsu Lake	62-86	(25)	E
07QD006	... Porter Lake Outflow	82-86	(5)	E
07QD005	... Porter Lake Outflow above Taltson River	77-81	(5)	E
	... Tazin River:			
07QC003	.... Thoa River near Inlet to Hill Island Lake	68-86	(19)	E
07QC004	..... Marten River above Thoa River	77-86	(10)	E
07PB002	.. Little Buffalo River above Highway No. 5	65-86	(22)	C
07PA001	.. Buffalo River at Highway No. 5	68-84	(17)	A
07OB001	.. Hay River near Hay River	29-31, 63-86	(24)	C
07UC001	. Kakisa River at Outlet of Kakisa Lake	62-86	(25)	C
	. Horn River:			
10FC001	.. Plateau Creek near Willow Lake	76-85	(10)	C
10FA002	. Trout River at Highway No. 1	69-85	(16)	B
10FB005	. Jean-Marie River at Highway No. 1	72-85	(14)	B
10ED001	. Liard River at Fort Liard	65-86	(22)	(BP)E
10ED002	. Liard River near the Mouth	72-86	(15)	(BP)E
10ED004	.. Rabbit Creek below Highway No. 7	78-83	(6)	C
10ED006	.. Rabbit Creek at Highway No. 7	84-86	(3)	C
10EB001	.. South Nahanni River above Virginia Falls	60-85	(26)	B
10EC001	.. South Nahanni River above Clausen Creek	59-85	(26)	B
10EB002	... Mac Creek near the Mouth	78-85	(8)	B
10EB003	... Lened Creek above Little Nahanni River	82-86	(5)	C
10EA002	... Flat River at Cantung Camp	60-62, 73-85	(16)	B
10EA003	... Flat River near the Mouth	60-85	(26)	B
10EC002	... Prairie Creek at Cadillac Mine	74-85	(12)	B
10ED003	.. Birch River at Highway No. 7	74-85	(12)	B
10GC002	. Harris River near the Mouth	73-85	(13)	B
10GC003	. Martin River at Highway No. 1	72-85	(13)	B

Sta. No.	Station Name	Review Period (Yrs.)		Note
	Mackenzie River:			
10GA001	. Root River near the Mouth	74-85	(11)	B
10GB001	. Willowlake River above Metahdali Creek	75-85	(11)	B
10GB006	. Willowlake River below Metahdali Creek	64-74	(11)	B
10GB005	.. Metahdali Creek above Willowlake River	76-85	(10)	B
10HB003	. Wrigley River near the Mouth	76-85	(10)	B
10HB005	. Redstone River 63 km above Mouth	74-86	(12)	C
10HB001	. Redstone River near the Mouth	63-74	(12)	C
10HB004	.. Silverberry River near Little Dal Lake	80-86	(7)	D
	. Keele River:			
10HA002	.. Tsichu River at Canol Road	75-86	(12)	C
10HA003	.. Twitya River near the Mouth	80-86	(7)	D
10HC003	. Big Smith Creek near Highway No. 1	73-86	(14)	C
10JC003	. Great Bear River at Outlet of Great Bear Lake	61-86	(26)	E
	.. Great Bear Lake:			
10JD002	... Whitefish River near the Mouth	77-86	(10)	D
10JD001	... Haldane River near the Mouth	75-86	(12)	D
10JE001	... Sloan River near the Mouth	76-86	(11)	D
10JA002	... Camsell River at Outlet of Clut Lake	63-86	(24)	D
10JA004	.... Acasta River above Little Crapeau Lake	80-86	(7)	D
10JB001	... Johnny Hoe River above Lac Ste. Therese	69-86	(18)	D
10KA006	. Jungle Ridge Creek near the Mouth	79-86	(7)	C
10KA005	. Seepage Creek at Norman Wells	74-78	(5)	C
10KA007	. Bosworth Creek near Norman Wells	80-86	(7)	C
10KA003	. Bosworth Creek at Norman Wells	73-79	(7)	C
10KB001	. Carcajou River below Imperial River	76-86	(11)	D
10KC001	. Mountain River below Cambrian Creek	74-86	(13)	D
10LD002	. Jackfish Creek near Fort Good Hope	80-86	(7)	D
10LA002	. Arctic Red River near the Mouth	68-86	(19)	D
10LA004	.. Weldon Creek near the Mouth	77-86	(10)	D
10MC002	. Peel River above Fort McPherson	69-86	(18)	D
10MC007	. Rat river near Fort McPherson	81-86	(6)	D
10LC003	. Rengleng River below Highway No. 8	72-86	(15)	D
	. Campbell Creek:			
10LC009	.. Cabin Creek above Highway No. 8	80-86	(7)	D
10LC007	.. Caribou Creek above Highway No. 8	75-86	(12)	D
10LC010	. Boot Creek near Inuvik	81-86	(6)	D
	Arctic Ocean Drainage:			
	Liverpool Bay:			
10ND002	. Trail Valley Creek near Inuvik	77-86	(10)	D
10ND001	. Hans Creek near Inuvik	77-86	(10)	D
10ND003	. Zed Creek near Inuvik	78-82	(5)	D
10NC001	. Anderson River below Carnwath River	69-84	(16)	A
10NA001	.. Carnwath River below Andrew River	82-86	(5)	F
10OC001	Inman River near the Mouth	75-76, 78-86	(11)	F
10PB001	Coppermine River at Outlet of Point Lake	65-86	(22)	F
10PC001	. Kendall River near Outlet of Dismal Lakes	69-86	(18)	F
10PC002	.. Atitok Creek near Dismal Lakes	79-86	(8)	F
10QA001	Tree River near the Mouth	69-86	(18)	F
10QC001	Burnside River near the Mouth	76-86	(11)	F
10QC002	Gordon River near the Mouth	77-86	(10)	F
10QD001	Ellice River near the Mouth	71-84	(14)	A

Sta. No.	Station Name	Review Period (Yrs.)	Note
	Arctic Ocean Drainage:		
10RA001	Back River below Beechy Lake	77-86 (10)	F
10RC001	Back River above Hermann River	62-84 (20)	A
10RA002	. Baillie River near the Mouth	78-86 (9)	F
10SB001	Hayes River above Chantrey Inlet	71-86 (16)	F
	Arctic Islands Drainage:		
10TF001	Freshwater Creek near Cambridge Bay	70-86 (17)	F
10TA001	Big River above Egg River	75-81, 83-86 (11)	F
10VC002	Mecham River near Resolute	71-78 (8)	F
10VC001	Allen River near the Mouth	71-86 (16)	F
10UF001	Duval River near Pangnirtung	74-83 (10)	F
10UH002	Apex River at Apex	73-86 (14)	F
10UH001	Sylvia Grinnel River near Iqaluit	71-86 (16)	F
10UB001	Marcil Creek near Arctic Bay	78-83 (6)	F
10UE001	Tulugak River on Broughton Island	75-83 (9)	F
	Hudson Bay Drainage:		
06QA001	Lorillard River above Daly Bay	78-86 (9)	G
06MB001	Quoich River above St. Clair Falls	72-86 (15)	G
	Baker Lake Basin:		
06LA001	. Kazan River at Outlet of Ennadai Lake	65-86 (22)	G
06LC001	. Kazan River above Kazan Falls	65-86 (22)	G
06LC003	.. Siurac Creek near Outlet to Kazan River	79-86 (8)	G
06LC002	.. Kunwak River below Princess Mary Lake	77-86 (10)	G
06MA002	. Qinguo Creek near Baker Lake	69-78, 81-86 (16)	G
06JC002	. Thelon River above Beverley Lake	70, 72-85 (15)	B
06MA003	. Thelon River above Baker Lake	73-82 (10)	A
06JB001	.. Hanbury River above Hoare Lake	71-86 (16)	G
06KC003	.. Dubawnt River at Outlet of Marjorie Lake	68-78 (10)	B
06KC001	.. Dubawnt River below Marjorie Lake	60-67 (4)	B
06MA004	. Akkutuak Creek near Baker Lake	78-86 (9)	G
06MA005	. Prince River near Baker Lake	79-86 (8)	G
06NB002	Ferguson River below O'Neil Lake	79-86 (8)	G
06HD002	Tha-Anne River below South Menik Lake	78-85 (8)	G
06HD001	. Kognak River below Mountain Lake	77-86 (10)	G
06HB002	Thlewiaza River below Sealhole Lake	78-86 (9)	G

A - Review Completed in 1986-87: 5 stations, 77 station-years
B - Review Completed in 1987-88: 19 stations, 264 station-years
C - Review Completed in 1988-89: 22 stations, 250 station-years
D - Review Completed in 1989-90: 22 stations, 245 station-years
P - Preliminary Report only
Note: Stations with less than 5 years of discharge records or those established since 1983 are not included in this Review Program.

Total Review Program	**:**	**119 stations (1535 station-years)**
Total Reviewed to 1989-90	:	68 stations (836 station-years)
E - Proposed Program for 1990-91	:	14 stations (237 station-years)
F - Proposed Program for 1991-92	:	23 stations (292 station-years)
G - Proposed Program for 1992-93	:	14 stations (170 station-years)

3.1 Proposed Program for 1990-91

Computer-generated comparison hydrographs (and manually-computed monthly and annual mathematical comparisons) for stations on the Liard and Mackenzie Rivers indicate many periods of negative ungauged inflow and/or periods that are not in reasonable agreement, especially during break-up and freeze-up.

The review (revision) of streamflow data for stations (listed below) on the main stem of the Liard and Mackenzie Rivers should therefore be carried out as a unit to ensure compatibility of final results. This should include an examination of the data for five stations (listed below) in the upper Liard River basin which are operated by the Pacific and Yukon Office, to support the review of data for the lower Liard River stations in the NWT.

Stations operated by the NWT Programs Office (Yellowknife):

Sta. No.	Station Name	Review Period	(Yrs.)
10FB001	Mackenzie River near Fort Providence	61-78	(18)
10GC001	Mackenzie River at Fort Simpson	59-86	(28)
10KA001	Mackenzie River at Norman Wells	62-86	(25)
10LC014	Mackenzie River at Arctic Red River	72-86	(15)
10LC002	Mackenzie River (East Channel) at Inuvik	73-86	(14)
10ED001	Liard River at Fort Liard	65-86	(22)
10ED002	Liard River near the Mouth	72-86	(15)
10JC003	Great Bear River at Outlet of Great Bear Lake	61-86	(26)
	8 stations (163 stations-years)		

Stations operated by the Pacific and Yukon Office (Vancouver):

Sta. No.	Station Name	Review Period	(Yrs.)
10BE001	Liard River at Lower Crossing	65-86	(22)
10BE005	Liard River above Beaver River	68-86	(19)
10CD001	Muskwa River near Fort Nelson	78-86	(9)
10CC002	Fort Nelson River above Muskwa River	78-86	(9)
10CC001	Fort Nelson River at Fort Nelson	65-78	(14)
	5 stations (73 station-years)		

The following six stations operated by the NWT Programs Office are also recommended for review:

Sta. No.	Station Name	Review Period	(Yrs.)
07QD004	Taltson River above Porter Lake Outflow	77-86	(10)
07QA001	Taltson River at Outlet of Tsu Lake	62-86	(25)
07QD006	Porter Lake Outflow	82-86	(5)
07QD005	Porter Lake Outflow above Taltson River	77-81	(5)
07QC003	Thoa River near Inlet to Hill Island Lake	68-86	(19)
07QC004	Marten River above Thoa River	77-86	(10)
	6 stations (74 station-years)		

Summary of Reports:

Final Review Reports for 14 stations (237 station-years)
Preliminary Review Reports for 5 stations (73 station-years)
1990-91 Summary Report

3.2 Proposed Program for 1991-92

The following stations are recommended for review (this will complete the review of selected stations in the Mackenzie River basin):

Sta. No.	Station Name	Review Period	(Yrs.)
07RD001	Lockhart River at Outlet of Artillery Lake	44-49, 63-86	(30)
07RC001	Thonokied River near the Mouth	80-86	(7)
07QB002	Snowdrift River at Outlet of Siltaza Lake	77-86	(10)
	3 stations (47 station-years)		

The following stations in the Arctic Ocean Drainage are recommended for review:

Sta. No.	Station Name	Review Period	(Yrs.)
10NA001	Carnwath River below Andrew River	82-86	(5)
10OC001	Inman River near the Mouth	75-77, 78-86	(11)
10PB001	Coppermine River at Outlet of Point Lake	65-86	(22)
10PC001	Kendall River near Outlet of Dismal Lakes	69-86	(18)
10PC002	Atitok Creek near Dismal Lakes	79-86	(8)
10QA001	Tree River near the Mouth	69-86	(18)
10QC001	Burnside River near the Mouth	76-86	(11)
10QC002	Gordon River near the Mouth	77-86	(10)
10RA001	Back River below Beechy Lake	77-86	(10)
10RA002	Baillie River near the Mouth	78-86	(9)
10SB001	Hayes River above Chantrey Inlet	71-86	(16)
	11 stations (138 station-years)		

The following stations in the Arctic Islands Drainage are recommended for review:

Sta.No.	Station Name	Review Period	(Yrs.)
10TF001	Freshwater Creek near Cambridge Bay	70-86	(17)
10TA001	Big River above Egg River	75-81, 83-86	(11)
10VC002	Mecham River near Resolute	71-78	(8)
10VC001	Allen River the Mouth	71-86	(16)
10UF001	Duval River near Pangnirtung	74-83	(10)
10UH002	Apex River at Apex	73-86	(14)
10UH001	Sylvia Grinnel River near Iqaluit	71-86	(16)
10UB001	Marcil Creek near Arctic Bay	78-83	(6)
10UE001	Tulugak River on Broughton Island	75-83	(9)
	9 stations (107 station-years)		

Summary of Reports:

Final Review Reports for 23 stations (292 station-years)
1991-92 Summary Report

3.3 Proposed Program for 1992-93

The following stations in the Hudson Bay Drainage (including the Baker Lake Basin) are recommended for review:

Sta. No.	Station Name	Review Period	(Yrs.)
06QA001	Lorillard River above Daly Bay	78-86	(9)
06MB001	Quoich River above St. Clair Falls	72-86	(15)
06LA001	Kazan River at Outlet of Ennadai Lake	65-86	(22)
06LC001	Kazan River above Kazan Falls	65-86	(22)
06LC003	Siurac Creek near Outlet to Kazan River	79-86	(8)
06LC002	Kunwak River below Princess Mary Lake	77-86	(10)
06MA002	Qinguo River near Baker Lake	69-78, 81-86	(16)
06JB001	Hanbury River above Hoare Lake	71-86	(16)
06MA004	Akkutuak Creek near Baker Lake	78-86	(9)
06MA005	Prince River near Baker Lake	79-86	(8)
06NB002	Ferguson River below O'Neil Lake	79-86	(8)
06HD002	Tha-Anne River below South Menik Lake	78-85	(8)
06HD001	Kognak River below Mountain Lake	77-86	(10)
06HB002	Thlewiaza River below Sealhole Lake	78-86	(9)

14 stations (170 station-years)

Summary of Reports:

Final Review Reports for 14 stations (170 station-years)
1992-93 Summary Report
Summary Report for Overall Data Review Program for 1986 to 1993

4. LIST OF REVIEW REPORTS

4.1 1986-87 Program

4.1.1 Final Review Reports were completed for:

Sta. No.	Station Name	Review Period	(Yrs.)
10NC001	Anderson River below Carnwath River	69-84	(16)
10RC001	Back River above Hermann River	62-84	(20)
07PA001	Buffalo River at Highway No. 5	68-84	(17)
10QD001	Ellice River near the Mouth	71-84	(14)
06MA003	Thelon River above Baker Lake	73-82	(10)
	TOTALS (5 stations)		**(77)**

4.1.2 Preliminary Review Reports were prepared for:

Sta. No.	Station Name	Review Period	(Yrs.)
06KC003	Dubawnt River at Outlet of Marjorie Lake	60-84	(25)
10EA003	Flat River near the Mouth	60-84	(25)
10EC001	South Nahanni River above Clausen Creek	59-84	(25)
10EB001	South Nahanni River above Virginia Falls	60-84	(25)
06JC001	Thelon River above Beverly Lake	70-84	(15)
	TOTALS (5 stations)		**(115)**

4.1.3 Summary Report dated 1987-03-23 was prepared:

Title:

Summary Report for
Hydrometric Survey Data Review to 1984
for Selected Stations
in the Northwest Territories

4.2 1987-88 Program

4.2.1 Final Review Reports were completed for:

Sta. No.	Station Name	Review Period	(Yrs.)
10ED003	Birch River at Highway No. 7	74-85	(12)
10KC003	Dubawnt River at Outlet of Marjorie Lake	68-78	(10)
06KC001	Dubawnt River below Marjorie Lake	60-67	(4)
10EA002	Flat River at Cantung Camp	60-85	(16)
10EA003	Flat River near the Mouth	60-85	(26)
10GC002	Harris River near the Mouth	73-85	(13)
10FB005	Jean-Marie River at Highway No. 1	72-85	(14)
10EB002	Mac Creek near the Mouth	78-85	(8)
10GC003	Martin River at Highway No. 1	73-85	(13)
10GB005	Metahdali Creek above Willowlake River	76-85	(10)
10EC001	Prairie Creek at Cadillac Mine	74-85	(12)
10GA001	Root River near the Mouth	74-85	(11)
10EC001	South Nahanni River above Clausen Creek	59-85	(26)
10EB001	South Nahanni River above Virginia Falls	60-85	(26)
06JC002	Thelon River above Beverly Lake	70-85	(15)
10FA002	Trout River at Highway No. 1	69-85	(16)
10GB006	Willowlake River above Metahdali Creek	75-85	(11)
10GB001	Willowlake River below Metahdali Creek	64-74	(11)
10HB003	Wrigley River near the Mouth	76-85	(10)
	TOTALS (19 stations)		**(264)**

4.2.2 Preliminary Review Reports were prepared for:

Sta. No.	Station Name	Review Period	(Yrs.)
10ED001	Liard River at Fort Liard	65-85	(21)
10ED002	Liard River near the Mouth	72-85	(14)
	TOTALS (2 stations)		**(35)**

4.2.3 Summary Report dated March 1988 was prepared:

Title:

SUMMARY REPORT For
HYDROMETRIC SURVEY DATA REVIEW To 1985
For Selected Gauging Stations
In The Northwest Territories

4.3 1988-89 Program

4.3.1 Final Review Reports were completed for:

Sta. No.	Station Name	Review Period	(Yrs.)
07SB009	Baker Creek near Yellowknife	68-82	(15)
10HC003	Big Smith Creek near Highway No. 1	73-86	(14)
10KA003	Bosworth Creek at Norman Wells	73-79	(7)
10KA007	Bosworth Creek near Norman Wells	80-86	(7)
07SB010	Cameron River below Reid Lake	75-86	(12)
07TB001	Emile River at Outlet of Basler Lake	78-86	(12)
07OB001	Hay River near Hay River	63-86	(24)
07SA004	Indin River above Chalco Lake	77-86	(10)
10KA006	Jungle Ridge Creek near the Mouth	79-86	(7)
07UC001	Kakisa River at Outlet of Kakisa Lake	62-86	(25)
07TA001	La Martre River below Outlet of Lac La Martre	75-86	(12)
10EB003	Lened Creek above Little Nahanni River	82-86	(5)
07PB002	Little Buffalo River below Highway No. 5	65-86	(22)
10FC001	Plateau Creek near Willow Lake	76-85	(10)
07PB011	Pocket Lake Outflow near Yellowknife	67-78	(12)
10ED006	Rabbit Creek at Highway No. 7	84-86	(3)
10ED004	Rabbit Creek below Highway No. 7	78-83	(6)
10HB005	Redstone River 63 km above Mouth	75-86	(12)
10HB001	Redstone River near the Mouth	63-74	(12)
10KA005	Seepage Creek at Norman Wells	74-78	(5)
10HA002	Tsichu River at Canol Road	75-86	(12)
07SC002	Waldron River near the Mouth	78-86	(9)
	TOTALS (22 stations)		**(250)**

4.3.2 Preliminary Review Reports were prepared for:

Sta. No.	Station Name	Review Period	(Yrs.)
10FB001	Mackenzie River near Fort Providence	61-78	(18)
10GC001	Mackenzie River at Fort Simpson	59-86	(28)
	TOTALS (2 stations)		**(46)**

4.3.3 Summary Report dated March 1989 was prepared:

Title:

1988-89 SUMMARY REPORT For
REVIEW OF HYDROMETRIC SURVEY DATA To 1986
For Selected Gauging Stations
In The Northwest Territories

4.4 1989-90 Program

4.4.1 Final Review Reports were completed for:

Section No.	Sta. No.	Station Name	Review Period	(Yrs.)
5.3.1	10JA004	Acasta River below Little Crapeau Lake	80-86	(7)
5.3.2	10LA002	Arctic Red River near the Mouth	68-86	(19)
5.3.3	10LC010	Boot Creek near Inuvik	81-86	(6)
5.3.4	10LC009	Cabin Creek above Highway No. 8	80-86	(7)
5.3.5	10JA002	Camsell River at Outlet of Clut Lake	63-86	(24)
5.3.6	10KB001	Carcajou River below Imperial River	76-86	(11)
5.3.7	10LC007	Caribou Creek above Highway No. 8	75-86	(12)
5.3.8	10JD001	Haldane River near the Mouth	75-86	(12)
5.3.9	10ND001	Hans Creek near Inuvik	77-86	(10)
5.3.10	10LD002	Jackfish Creek near Fort Good Hope	80-86	(7)
5.3.11	10JB001	Johnny Hoe River above Lac Ste. Therese	69-86	(18)
5.3.12	10KC001	Mountain River below Cambrian Creek	74-86	(13)
5.3.13	10MC002	Peel River above Fort McPherson	69-86	(18)
5.3.14	10MC007	Rat River near Fort McPherson	81-86	(6)
5.3.15	10LC003	Rengleng River below Highway No. 8	72-86	(15)
5.3.16	10HB004	Silverberry River near Little Dal Lake	80-86	(7)
5.3.17	10JE001	Sloan River near the Mouth	76-86	(11)
5.3.18	10ND002	Trail Valley Creek near Inuvik	77-86	(10)
5.3.19	10HA003	Twitya River near the Mouth	80-86	(7)
5.3.20	10LA004	Weldon Creek near the Mouth	77-86	(10)
5.3.21	10JD002	Whitefish River near the Mouth	77-86	(10)
5.3.22	10ND003	Zed Creek near Inuvik	78-82	(5)
		TOTALS (22 stations)		**(245)**

4.4.2 Summary Report dated March 1990 was prepared:

Title:

1989-90 SUMMARY REPORT for
for the Fourth Year of the Seven-Year Program for the
REVIEW of HYDROMETRIC SURVEY DATA to 1986
for Selected Gauging Stations
in the Northwest Territories

5. SUMMARY OF REVISIONS

One should be careful when using percentage differences to indicate or to assess the extent of revisions, e.g., a revision from 400 to 100 is -75% but one from 100 to 400 is +300% (a "minus" revision can never be more than 100%), yet the mathematical difference is 300 in both cases. Also, a revision of -40% at low water may "appear" to be more significant than a -10% revision at high flow, when actually much more water is involved during high-water periods.

Review Reports were completed for 22 stations (245 station-years). A revision of some type (including deletion and extension) was made to 18 stations (97 station-years of data), involving 9273 days and 379 months. More than one type of revision (deletion or extension) may apply to a particular month or year - see Section 5.1. No revisions were made to 4 stations (32 station-years):

10JA004	Acasta River below Little Crapeau Lake	(1980-86)
10ND001	Hans Creek near Inuvik	(1977-86)
10ND002	Trail Valley Creek near Inuvik	(1977-86)
10ND003	Zed Creek near Inuvik	(1978-82)

Data were deleted for 5 stations (1641 daily discharges, involving 49 months and 12 years) - see Section 5.2.1.

An important feature of this Review is that "short" periods of missing daily discharges were estimated to complete the records for 28 years for 14 stations (3479 daily discharges, involving 136 months); missing 1981 data were estimated for 10 stations (see Section 5.2.2).

Highlights of other significant revisions are:

(a) 10LA002 Arctic Red River near the Mouth (1969-86)
- an intense historical storm event occurred on July 22, 1970; a HWM of 10.853 m was obtained, however, the peak of 7650 m^3/s is debatable and was deleted from the PEAKS file

(b) 10JD001 Haldane River near the Mouth (1975-86)
- revisions for 1985 to 1988 were made by the Yellowknife Office in 1989 when it was discovered that the recorder/manometer gear ratio was 1:150 not 1:125 (628 daily discharges were revised, involving 25 months)

(c) 10JB001 Johnny Hoe River above Lac Ste. Therese (1969-86)
- a revision of some type was made to 11 years, including the estimation of flows during break-up for 6 years
- the historical maximum daily discharge now is 650B m^3/s on May 13, 1975 (not previously published) - not 646 on May 12, 1973 which was revised to 450 m^3/s
- the historical minimum daily discharge now is 0.870B m^3/s on April 19, 1972 (not previously published) - not 1.49B m^3/s on April 10, 1985
- the mean annual discharge for 1970 to 1986 was revised by -6% from 42.4 to 39.7 m^3/s

Highlights (continued)

(d) 10MC002 Peel River above Fort McPherson (1969-86)
- the Spring Field Camps which were carried out in 1988 and 1989 indicate that there is significant BW effect from the Mackenzie Delta during and after break-up which had not been considered in the original computations prior to 1987
- revisions were made to 428 daily discharges because of a different BW interpretation and/or a HW HQ revision, involving 29 months and 15 years
- the former historical maximum daily discharge was revised by -43% from 10 600 to 6000E m^3/s (now 7500B m^3/s on May 30, 1982)
- the mean discharge for December 1980 was revised by -44% from 180 to 100 m^3/s ("break in continuity")
- the mean annual discharge for 1975 to 1986 was revised by -7% from 751 to 698 m^3/s
- the stage-discharge relation is not well-defined and data should be used with discretion

(e) 10LC003 Rengleng River below Highway No. 8 (1972-86)
- a revision of some type was made 5 years, including the 365 daily discharges for 1977 which were not previously published
- the maximum daily discharge for the period of record was revised by -41% from 205 to 120E m^3/s (May 28, 1980)
- the mean annual discharge for 1976 to 1986 was revised by +4% from 2.68 to 2.80 m^3/s

(f) 10JD002 Whitefish River near the Mouth (1977-86)
- revisions were made to 800 daily discharges, involving 32 months and 5 years (including the estimation of 130 daily discharges for 1981)
- the mean discharge for December 1986 was revised by -45% from 0.631 to 0.348 m^3/s ("break in continuity")
- the mean annual discharge for 1978 to 1986 was revised by -6% from 13.5 to 12.7 m^3/s mainly due to the inclusion of 1981 data (not previously published)

There were 18 "breaks in continuity" of data from one year to the next, involving 10 stations (689 daily discharges, involving 33 months and 23 years). The most significant revisions were:

(a) 10LA002 Arctic Red River near the Mouth (1968-86)
Jan. 1976: revised by -7% from 7.75 to 7.22 m^3/s
Dec. 1980: revised by +3% from 15.8 to 16.2 m^3/s
Dec. 1981: revised by +9% from 11.8 to 12.9 m^3/s
Dec. 1982: revised by -1% from 10.2 to 10.1 m^3/s

(b) 10KB001 Carcajou River below Imperial River (1976-86)
Jan. 1982: revised by +9% from 8.11 to 8.80 m^3/s
Feb. 1982: revised by +5% from 6.10 to 6.38 m^3/s

(c) 10LC007 Caribou Creek above Highway No. 8 (1975-86
Jan. 1980: revised from 0 to 0.020 m^3/s
Jan. 1982: revised from 0 to 0.038 m^3/s
Dec. 1982: revised by -6% from 0.298 to 0.279 m^3/s
Jan. 1982: revised from 0 to 0.052 m^3/s
Jan. 1985: revised from 0 to 0.008 m^3/s

(d) 10JD001 Haldane River near the Mouth (1975-86)
Dec. 1977: revised by -68% from 0.153 to 0.049 m^3/s

(e) 10JB001 Johnny Hoe River above Lac Ste. Therese (1969-86)
Jan. 1982: revised by -3% from 3.81 to 3.71 m^3/s

(f) 10KC001 Mountain River below Cambrian Creek (1974-86)
Dec. 1978: revised by +1% from 24.5 to 24.7 m^3/s

(g) 10MC002 Peel River above Fort McPherson (1969-86)
Jan. 1976: revised by -3% from 83.7 to 80.8 m^3/s
Nov. 1980: revised by -16% from 189 to 159 m^3/s
Dec. 1980: revised by -44% from 180 to 100 m^3/s

(h) 10MC007 Rat River near Fort McPherson (1981-86)
Dec. 1983: revised by -25% from 0.354 to 0.265 m^3/s
Jan. 1984: revised from 0 to 0.019 m^3/s

(i) 10LC003 Rengleng River below Highway No. 8 (1972-86)
Dec. 1977: revised by -3% from 0.313 to 0.305 m^3/s
Jan. 1980: revised from 0 to 0.024 m^3/s

(j) 10JD001 Whitefish River near the Mouth (1977-86)
Dec. 1980: revised by +25% from 0.636 to 0.797 m^3/s
Jan. 1981: revised from 0 to 0.256 m^3/s
Nov. 1981: revised by +7% from 2.19 to 2.35 m^3/s
Dec. 1981: revised by -60% from 1.39 to 0.556 m^3/s
Jan. 1982: revised from 0 to 0.081 m^3/s
Nov. 1986: revised by -2% from 0.380 to 0.374 m^3/s
Dec. 1986: revised by -45% from 0.631 to 0.348 m^3/s

5.1 Types and Extent of Revisions

Following is a summary of the various types of revisions and the approximate number of years involved:

(a) discrediting records (12 years, 5 stations - see Section 5.2.1)

(b) completing missing records (28 years, 14 stations - see Section 5.2.2)

(c) "break in continuity" (18 cases for 10 stations)

(d) "spikes" (2 days, 2 years, 2 stations)

(e) winter recession (19 years, 8 stations)

(f) logarithmic recession - open water (5 years, 5 stations)

(g) shift or backwater distribution/interpretation (26 years, 10 stations)

(h) hydrograph shape, timing and magnitude of flows during break-up (4 years, 7 stations)

(i) chart interpretation (7 years, 5 stations)

(j) estimated period revised (1 year, 1 station)

(k) LW/HW stage-discharge curve revisions (16 years, 6 stations)

(l) wrong HQ table (1 year, 1 station)

(m) zero flow revised (7 years, 3 stations)

(n) discharge measurement adjusted or not used (4 years, 3 stations)

(o) historical minimum daily discharge revised (4 years, 4 stations)

(p) historical maximum daily discharge revised (3 years, 3 stations)

(q) historical maximum instantaneous discharge revised (2 years, 2 stations)

(r) wrong recorder/manometer gear (4 years, 1 station)

5.2 Deletion and Extension of Data

5.2.1 Deletion of Data

Daily discharge data were discredited (deleted) mainly because inadequate data are available to produce reliable results that meet national standards and thus are suitable for distribution to users. Revisions (deletions) were made to 5 stations (1641 days, involving 49 months and 12 years). Data were deleted for the following 5 stations:

(a) 10LA002 Arctic Red River near the Mouth (1968-86)
- 100 days (involving 5 months and 3 years - 1970, 1972 and 1976)
- maximum instantaneous discharge for 1970

(b) 10LC009 Cabin Creek above Highway No. 8 (1980-86)
- 944 days (involving 19 months and 3 years - 1980, 1981 and 1983)

(c) 10KC001 Mountain River below Cambrian Creek (1974-86)
- 459 days of fragmentary data involving 18 months for 1975 to 1977
- there are now no data on the FLOW file for these 3 years

(d) 10MC002 Peel River above Fort McPherson (1969-86)
- 83 days (involving 5 months and 2 years - 1971 and 1974)

(e) 10LC003 Rengleng River below Highway No. 8 (1972-86)
- 55 days (involving 2 months and 1 year - 1974)

5.2.2 Extension of Data

Missing daily discharges for "short" periods of record were estimated to complete a year or to produce a complete block of data for 14 stations. Revisions (extensions) were made for 3479 daily discharges, involving 136 months and 28 years. Estimates to complete the data for 1981 were made to 10 stations. Zero flow was entered for 24 full months. Data were inadvertently not published for 3 full years. Data were estimated for the following 14 stations:

(a) 10LC010 Boot Creek near Inuvik (1981-86
- 128 days, involving 5 months and 1 year (1984)
- zero flow added to January 1 to May 6 (4 complete months)

(b) 10JA002 Camsell River at Outlet of Clut Lake (1963-86)
- 237 days, involving 9 months and 2 years (1963 and 1964)

(c) 10KB001 Carcajou River below Imperial River (1976-86)
- 127 days, involving 5 months and 1 year (1981)

(d) 10JD001 Haldane River near the Mouth (1975-86)
- 476 days, involving 17 months and 5 years (1978, 1981-82 and 1984-85)
- including 13 months of zero flow

5.2.2 Extension of Data (continued)

(e) 10JD002 Jackfish Creek near Fort Good Hope (1980-86)
- 282 days, involving 11 months and 2 years (1980 and 1981)
- including 7 months of zero flow

(f) 10JB001 Johnny Hoe River above Lac Ste. Therese (1969-86)
- 548 days, involving 26 months and 6 years (1971-72, 1975-77 and 1981)

(g) 10KC001 Mountain River below Cambrian Creek (1974-86)
- 184 days, involving 9 months and 2 years (1981 and 1982)

(h) 10MC007 Rat River near Fort McPherson (1981-86)
- 47 days, involving 3 months and 1 year (1981)

(i) 10LC003 Rengleng River below Highway No. 8 (1972-86)
- 365 days (1977 data were originally computed but inadvertently were not submitted for publication)
- in this Review, daily discharges for May 21 to June 15 were revised because of HW HQ revisions
- the mean discharge for 1977 was revised by -19% from 5.10 to 4.12 m^3/s

(j) 10HB004 Silverberry River near Little Dal Lake (1980-86)
- 365 days (1981 data were originally computed but inadvertently were not submitted for published)

(k) 10JE001 Sloan River near the Mouth (1976-86)
- 140 days, involving 6 months and 2 years (1978 and 1981)

(l) 10HA003 Twitya River near the Mouth (1980-86)
- 408 days, involving 14 months and 2 years (1980 and 1984)
- (365 days - 1981 - were originally computed but inadvertently were not submitted for publication - in this Review, a measurement was discarded and open-water daily discharges were revised - missing daily discharges for July 8 to September 22 were estimated to complete the year)

(m) 10LA004 Weldon Creek near the Mouth (1977-86)
- 42 days, involving 2 months and 1 year (1978)

(n) 10JD002 Whitefish River near the Mouth (1977-86)
- 130 days, involving 5 months and 1 year (1981)

5.3 Summary of Revisions and Recommendations for Each Station

A summary of the revisions that were made for each station is given in this section. The recommendations for each station are also included. Detailed explanations are provided in individual Review Reports. The stations are reported in alphabetical order (see Section 4.4.1 for the complete list of stations).

5.3.1 10JA004 Acasta River below Little Crapeau Lake (1980-86)

No revisions were made.

It is recommended that:

1. more discharge measurements be obtained during BW periods and HW (bank overflow); and

2. the elevation of zero flow be obtained annually.

5.3.2 10LA002 Arctic Red River near the Mouth (1968-86)

An intense historical storm event occurred on July 22, 1970 and a HWM of 10.853 m and a slope-area determination of 7650 m^3/s were obtained. However, the discharge is debatable and cannot be confirmed because the base data are missing and therefore this discharge was deleted from the PEAKS file.

Other significant features of this Review are:
1. Missing daily discharges for 268 days, involving 13 months and 7 years were not completed because of inadequate base data;
2. Daily discharges for 100 days, involving 5 months and 3 years were deleted because of inadequate base data; and
3. HW flows during break-up were mostly estimated and should be used with discretion.

The maximum instantaneous discharges for 7 years were deleted from the PEAKS file.

Daily discharges for October 8 to November 15, 1968 and October 10 to November 9, 1973 were revised to show a smoother winter recession.

Daily discharges for January 1 to 16, 1976, December 6 to 31 1980 and November 24, 1981 to January 19, 1982 were revised because of a "break in continuity".

Daily discharges for May 10 to 22, 1977 were revised (BW interpretation during break-up). The maximum daily discharge was revised by +32% from 680B to 900B m^3/s; this had been the lowest maximum daily discharge for the period of record for 1969-86.

The daily discharge for May 6, 1982 was revised by -7% from 25.5B to 23.7B m^3/s (computation error - "spike" on hydrograph).

Summary of significant revisions to monthly mean discharges:

Oct. 1968:	revised by	-5%	from 46.0	to 43.9	m^3/s
Oct. 1973:	revised by	-20%	from 69.0	to 55.9	m^3/s
Jan. 1976:	revised by	-7%	from 7.75	to 7.22	m^3/s
May 1977:	revised by	+14%	from 385	to 440	m^3/s
Dec. 1981:	revised by	+9%	from 11.8	to 12.9	m^3/s

Revisions were made to 283 daily discharges, involving 17 months and 9 years (this includes the deletion of 100 daily discharges, involving 5 months and 3 years).

The mean annual discharge for 1968-86 was unchanged at 150 m^3/s.

5.3.2 10LA002 Arctic Red River (continued)

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: High flows should be used with discretion; an extreme flood event occurred on July 22, 1970 (10.583 m);

2. more discharge measurements be obtained at the extremes and especially during and after break-up, to define the stage-discharge relation more accurately;

3. the elevation of zero flow be obtained at least every 2 or 3 years to assist in defining the LW range of the HQ relation more accurately;

4. HQ Curve No. 3 be revised (especially below 2 m and above 4 m) for daily discharge computations subsequent to 1988;

5. since it is difficult to obtain HW measurements above 5.5 m by conventional current meter methods because of fast velocities and flowing debris or ice, that discharges be obtained by slope-area determination and that an area-velocity curve be developed;

6. the extent of BW from the Mackenzie Delta be evaluated to determine whether more reliable records can be obtained, by conducting extensive field surveys and by collecting continuous daily water levels at several locations on the Peel and Arctic Red Rivers and the Mackenzie Delta; and

7. the data be reviewed again when a better understanding of the river hydraulics has been obtained.

5.3.3 10LC010 Boot Creek near Inuvik (1981-86)

Daily discharges for August 16 to October 31, 1982 were revised from "zero flow" to show at least "some flow" (77 days).

Daily discharges for January 1 to May 7, 1984 were not previously published (OB for January 1 to May 6) and will now be included in the FLOW file, as well the two measurements made on May 7 and June 27. The shelter was vandalized and the recorder was stolen in 1984.

The symbol E was changed to A for 6 days for 2 years, and the symbol E was changed to B for 192 days for 2 years. The symbol E was added to 6 days (1982).

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion;

2. since the control is unstable and measuring conditions are difficult, that the following alternatives be considered to improve the reliability of the data:
   (a) more discharge measurements be obtained, preferably at the gauge site, but if made at the Airport road, then the time lag be determined more accurately and the extent of inflow also be determined;
   (b) a HW measuring facility be installed at the gauge site, e.g. cable carrier; or
   (c) the station be relocated; and

3. the Standard Period be changed from "May to October" to "All Year" to facilitate the comparison of annual data with other stations.

5.3.4 10LC009 Cabin Creek above Highway No. 8 (1980-86)

The daily discharges as originally computed at Location A for 1980, 1981 and 1983 (data for 1982 were not computed) are considered unreliable because of inadequate base data and therefore were deleted from the FLOW file (944 daily discharges, involving 31 months and 3 years). The HYDEX file will now show that miscellaneous measurements only are available from 1980 to 1983.

It is recommended that:

1. more discharge measurements be obtained to define the stage-discharge relation more accurately, especially during break-up or high water;

2. the elevation of zero flow be obtained at least annually; and

3. the Standard Period be changed from "May to October" to "All Year" to facilitate the comparison of annual data with other stations.

5.3.5 10JA002 Camsell River at Outlet of Clut Lake (1963-86)

Missing daily discharges for November 5, 1963 to February 27, 1964, March 3 to April 23, 1964, June 2 to July 20, 1964 and August 1 to 20, 1964 (237 days) were estimated to complete the records for the year.

Daily discharges for April 26 to May 20, 1966 (25 days) were revised because of several problems (BW/SC interpretation and LW HQ Curve). This involved the minimum daily discharge for the period 1964 to 1986 which was revised by +16% from 36.2B to 42.0E m^3/s. The mean discharge for April was revised by +0.2% from 48.8 to 48.9 m^3/s, for May by +2% from 46.0 to 48.0 m^3/s and for the year by +0.3% from 70.4 to 70.6 m^3/s.

The mean annual discharge for 1964-86 was revised by +1% from 94.5 to 95.7 m^3/s.

It is recommended that:

1. discharge measurements be obtained at the extreme stages, below 2.5 m (50 m^3/s) and above 3.4 m (170 m^3/s), to define the complete range of the stage-discharge relation more accurately.

5.3.6 10KB001 Carcajou River below Imperial River (1976-86)

Missing daily discharges for January 1 to May 7, 1981 were estimated and those for May 8 and 9 were revised to complete the records for the year and for the period 1978 to 1986.

Daily discharges for January 1 to February 28, 1982 were revised because of a "break in continuity" from 1981 to 1982. The estimated maximum daily discharge on August 13, 1982 was revised by +35% from 667E to 900E m^3/s (based on an extension of the chart trace). The maximum daily discharge was previously published as 741 m^3/s on May 30. The maximum instantaneous discharge as published for 1982 was deleted from the PEAKS file. The mean discharge for August 12 was also revised. The mean discharge for August, 1982 was revised by +7% from 196 to 210 m^3/s. Daily discharges for September 23 to October 19, 1982 were revised from an arithmetic interpolation to a logarithmic recession.

Daily discharges for November 16, 1983 to February 24, 1984 were revised to show a smoother winter recession.

The HQ relation is not defined in the HW range and therefore the symbol E was added to 4 maximum instantaneous discharges above 1000 m^3/s (PEAKS file) and to 5 daily discharges above 1000 m^3/s (3 years - FLOW file).

Revisions were made to 318 daily discharges, involving 14 months and 4 years (including the estimation of 127 missing daily discharges, involving 2 months and 1 year).

Summary of revisions to annual mean discharges:

1981: 47.4 m^3/s (not previously published)
1982: revised by +1% from 90.7 to 91.7 m^3/s
1983: revised by -0.4% from 56.7 to 56.5 m^3/s
1984: revised by -0.1% from 94.7 to 94.6 m^3/s

The mean annual discharge for 1978 to 1986 was revised by -4% from 79.8 to 76.3 m^3/s, mainly due to the completion of data for 1981.

It is recommended that:

1. more discharge measurements be obtained in the LW range below 3.8 m (40 m^3/s) and in the HW range above 6 m (500 m^3/s) to define the complete range of the stage-discharge relation and also to define the daily shift correction distribution more accurately;

2. the elevation of zero flow be obtained to assist in defining the shape of the HQ relation in the LW range; and

3. the records be reviewed again when the HQ relation has been defined more accurately, especially LW data in 1981 and HW data above 1000 m^3/s; and that the symbol E be added to all discharges above 1000 m^3/s subsequent to 1986, unless the HQ relation has been defined more accurately.

5.3.7 10LC007 Caribou Creek above Highway No. 8 (1975-86)

The maximum instantaneous discharges for 1975 and 1979 were deleted from the PEAKS file.

The symbol A was added to 1 day in 1985, the symbol B to 4 days in 1975 and the symbol E to 10 days in 1985.

Revisions were made to 19 daily discharges because of a different interpretation during break-up, involving 3 months and 2 years (1976 and 1978).

Maximum daily discharges were revised as follows:
1976: by +75% from 11.8B on June 2 to 20.0B m^3/s on May 30
1978: by +47% from 17.0B on June 8 to 25.0B m^3/s on June 3

Revisions were made to 127 daily discharges because of a "break in continuity", involving 6 months and 4 years (1980, 1982, 1983 and 1985).

The following significant revisions were made to monthly mean discharges:
May 1976: by +47% from 2.25 to 3.30 m^3/s
June 1978: by +19% from 9.19 to 10.9 m^3/s
Jan. 1980: from 0 to 0.020 m^3/s
Jan. 1982: from 0 to 0.038 m^3/s
Dec. 1982: by -6% from 0.298 to 0.279 m^3/s
Jan. 1983: from 0 to 0.052 m^3/s
Jan. 1985: from 0 to 0.008 m^3/s

Annual mean discharges were revised as follows:
1976: by +9% from 1.20 to 1.31 m^3/s
1978: by +8% from 1.70 to 1.84 m^3/s
1980: by +0.4% from 2.32 to 2.33 m^3/s
1982: unchanged at 2.23 m^3/s
1983: unchanged at 1.13 m^3/s
1985: unchanged at 0.755 m^3/s
Mean annual discharge for 1975-86 was revised by +1% from 1.61 to 1.63 m^3/s.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: **The stage-discharge relation is not well-defined and data should be used with discretion;**

2. more discharge measurements be obtained during break-up to define the BW interpretation more accurately and also during open-water periods to define the HQ relation (or daily shift correction distribution) more accurately;

3. since the interpretation of the shape of the recession after freeze-up is not consistent over the years, that more discharge measurements be obtained during this period to evaluate this flow characteristic (whether abrupt, gradual or variable); and

4. the elevation of zero flow be obtained at least annually, especially after HW flows to assist in defining the shape of the LW range of the HQ relation.

5.3.8 10JD001 Haldane River near the Mouth (1975-86)

Daily discharges for June 3 to 8 and June 12 to 17, 1977 (12 days) were revised because of a different BW interpretation during break-up and those for November 30 to December 31, 1977 (32 days) were revised because of a "break in continuity". The mean discharge for June was revised by -12% from 155 to 136 m^3/s and the maximum daily discharge by -33% from 524E to 350E m^3/s (this was also the peak for the period of record).

Daily discharges for November 11 to 30, 1978 were revised (20 days - winter recession). Missing daily discharges for December 1-31, 1978, January 1 to May 21, 1981, June 15 to July 16, 1982, January to April 1984 and December 1984 to April 1985 were estimated (13 months of zero flow) to complete the records for the 5 years.

The symbol E was added to June 10 to 16, 1976 (chart trace was estimated).

Revisions for 1985 to 1988 were made by the Yellowknife Office in 1989 when it was discovered that the recorder/manometer gear ratio was 1:150 not 1:125. This applies from July 23, 1985 to November 9, 1989 and revisions were made to the daily discharges for the following periods:
1985: July 23 to October 5 (75 days, 4 months)
1986: May 13 to December 6 (208 days, 8 months)
1987: June 1 to November 15 (168 days, 6 months)
1988: June 9 to December 2 (177 days, 7 months)

Significant revisions to monthly mean discharges were:
Aug. 1985: revised by -8% from 3.86 to 3.57 m^3/s
Aug. 1986: revised by -68% from 13.3 to 4.28 m^3/s
Sept 1986: revised by -78% from 8.81 to 1.92 m^3/s
Sept 1987: revised by -65% from 3.47 to 1.20 m^3/s
Aug. 1988: revised by -73% from 3.94 to 1.05 m^3/s
Oct. 1988: revised by -62% from 4.22 to 1.62 m^3/s

Revisions were submitted for maximum instantaneous discharges for 1986, 1987 and 1988.

The revisions for the above daily discharges for 1985 to 1988 were submitted to Ottawa by Yellowknife as part of this Review but only the data for 1985 and 1986 are included in the tabulation for the types of revisions. However, the HYDEX file should show that data have been reviewed to 1988.

It is recommended that:

1. more discharge measurements be obtained during break-up and at the extremes of the stage-discharge relation;

2. the elevation of zero flow be obtained at least annually; and

3. the Standard Period be changed from "May to October" to "All Year" to facilitate the comparison of annual data with other stations.

5.3.9 10ND001 Hans Creek near Inuvik (1977-86)

No revisions were made and missing daily discharges were not completed (inadequate base data).

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: **The stage-discharge relation is not well-defined and data should be used with discretion, especially during high water;**

2. the **Standard Period** be changed from "April to December" to "All Year" to facilitate the comparison of annual data with other stations; and

3. the **Station Description and the HYDEX File** be updated for both locations on Hans Creek (10ND001 for 1977 to 1987 and 10ND004 for 1988 to date; the files are mixed up).

5.3.10 10LD002 Jackfish Creek near Fort Good Hope (1980-86)

Missing daily discharges (282 days) for July 30, 1980 to May 7, 1981 were submitted to Ottawa for inclusion in the FLOW file.

Daily discharges (13 days) for August 3 to 12 and August 18 to 20, 1986 were revised to show "some" flow instead of zero flow. The mean discharge for August was revised from 0.013 to 0.014 m^3/s.

Revisions (including extensions) were made to 295 daily discharges, involving 12 months and 3 years.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: **The stage-discharge relation is not well-defined and data should be used with discretion;** and

2. the **Standard Period** be changed from "May to October" to "All Year" to facilitate the comparison of annual data with other stations.

5.3.11 10JB001 Johnny Hoe River above Lac Ste. Therese (1969-86)

The maximum instantaneous discharges as published for 1978, 1979 and 1983 were deleted from the PEAKS file (the peak probably occurred during break-up and cannot be determined). There now are no maximum instantaneous discharges shown for the period of record from 1969 to 1986.

Revisions were made to 1231 daily discharges, involving 51 months and 11 years. This includes the estimation of 548 missing daily discharges, involving 26 months and 6 years.

Missing daily discharges for 1971, 1972, 1975, 1976, 1977 and 1981 were estimated to give a complete block of data from 1970 to date, using Norman Wells temperatures, the shape of the discharge hydrographs for other years, and Willowlake River as a guide.

Summary of revisions (or extensions) of daily discharges:

1969: August 28 to December 31 (126 days revised)
- LW HQ revision and winter recession
1970: January 1 to 31 (31 days revised)
- winter recession
1971: April 22 to June 3 (43 days extended)
1972: March 24 to July 10 (109 days extended)
1973: April 27 to May 31 and October 10 to December 31 (118 days revised)
- ascending limb, HW HQ revision and logarithmic recession
1974: January 1 to May 15 and May 18 (136 days revised)
- logarithmic recession and revised estimate of peak
1975: April 24 to July 10, July 13 to August 24 and September 4 to November 5 (184 days extended)
- computation error in discharge measurement
1976: January 10 to April 12 and November 10 to December 31 (146 days revised)
- winter recession
1976: April 13 to May 5 (23 days extended)
1977: January 1 to June 5 (156 days revised)
- winter recession (96 days); estimated (60 days)
1981: January 1 to May 9 (129 days extended)
1982: January 1 to 30 (30 days revised)
- "break in continuity"

The most significant revisions were:

(a) 1975 historical maximum daily discharge of 650B m^3/s (not previously published)
(b) 1972 historical minimum daily discharge of 0.870B m^3/s (not previously published)
(c) Missing daily discharges were completed for 6 years
(d) Winter recessions for 1973-74 and 1976-77

The mean annual discharge for 1970 to 1986 was revised by -6% from 42.4 to 39.7 m^3/s.

5.3.11 10JB001 **Johnny Hoe River** (continued)

It is recommended that:

1. since the shape of the ascending limb, the timing and magnitude of the peak flow, and the shape of the descending limb are mostly estimated nearly every year, that the following note be added under Remarks in the next Historical Streamflow Summary publication: **High-water flows during break-up (especially prior to 1978) were mostly estimated and should be used with discretion;**

2. more discharge measurements be obtained during break-up;

3. the elevation of zero flow be obtained annually to assist in defining the shape of the LW range of the HQ curve; and

4. a new curve be drawn for current computations, using the corrected discharge for the May 15, 1975 measurement and LW extension to the elevation of zero flow.

5.3.12 10KC001 Mountain River below Cambrian Creek (1974-86)

Only miscellaneous gauge height data were obtained in 1974. The daily discharges as published for 1975 to 1977 are fragmentary and insufficient base data are available to produce continuous records; also, the stage-discharge relation is not defined in the high-water range. Therefore, the 459 daily discharges (involving about 18 months and 3 years) were deleted from the FLOW file and the HYDEX file should be changed to show: 1974-74 HRM; 1975-77 QRM; and 1978- QRC.

The 184 missing daily discharges for January 1 to May 7, May 24 to 27, and June 21 to 26, 1981 and for May 27 to July 12, 1982 were estimated to give a complete block of data for 1978 to 1986.

Daily discharges were revised as follows:

1978: December 18 to 31 (break in continuity) - 14 days
1981: May 8 to 11 (BW interpretation) - 4 days
1981: November 10 to December 31 (winter recession) - 52 days
1982: January 1 to April 20 (winter recession) - 110 days
1982: September 20 to October 19 (winter recession) - 30 days
1983: October 12 to December 31 (winter recession) - 81 days
1984: January 1 to April 6 (winter recession) - 97 days
1985: April 27 to May 18 (shape of ascending limb) - 22 days
1986: October 14 to December 31 (winter recession - slush) - 79 days
1987: January 1 to March 19 (winter recession - slush) - 78 days
1987: (not included in summation of total days revised)

The symbol E was added to all discharges above 900 m^3/s. The symbol E was added to only 2 daily discharges (the maximum daily discharges for 1980 and 1986) and to the maximum instantaneous discharges for 7 years (1978 to 1980 and 1983 to 1986).

Summary of significant revisions to monthly mean discharges:

Jan. 1982: revised by -27% from 18.8 to 13.7 m^3/s
Feb. 1982: revised by -35% from 15.8 to 10.3 m^3/s
Dec. 1983: revised by +17% from 16.1 to 18.9 m^3/s
Jan. 1984: revised by +19% from 11.0 to 13.1 m^3/s
May 1985: revised by +11% from 103 to 114 m^3/s
Nov. 1986: revised by +45% from 23.5 to 34.1 m^3/s
Dec. 1986: revised by +34% from 19.2 to 25.8 m^3/s

The historical maximum daily discharge of 1320E m^3/s on August 13, 1982 for the period 1978-86 was not previously published and replaces the 1140 m^3/s on August 14, 1986.

Revisions were made to 673 daily discharges, involving 30 months and 7 years (including the estimation of 184 missing daily discharges, involving 9 months and 2 years) for the period 1978 to 1986.

5.3.12 10KC001 Mountain River (continued)

Summary of revisions to annual mean discharges:

1978: unchanged at 104 m^3/s
1979: no revisions were made
1980: no revisions were made
1981: 107 m^3/s (not previously published)
1982: 132 m^3/s (not previously published)
1983: unchanged at 109 m^3/s
1984: unchanged at 130 m^3/s
1985: unchanged at 113 m^3/s
1986: revised by +1% from 162 to 164 m^3/s

The mean annual discharge for 1978 to 1986 was revised by -1% from 124 to 123 m^3/s (revisions were compensating - mainly due to the completion of data for 1981 and 1982).

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: **The stage-discharge relation is not well-defined and data should be used with discretion;**

2. more discharge measurements be obtained in the LW range below 3.7 m (70 m^3/s) and in the HW range above 6 m (600 m^3/s) to define the HQ relation more accurately, especially at the extremes and during break-up and freeze-up; that the magnitude of the surge in the orifice pool be documented; that the elevation of zero flow be obtained; and that an area-velocity curve be developed;

3. the extent of slush conditions (if any) during winter measurements be documented; and

4. the data be reviewed again after a new HQ curve has been developed, especially in the HW range; and that the symbol E be added to all discharges above 900 m^3/s subsequent to 1986, unless the HQ relation has been defined more accurately.

5.3.13 10MC002 Peel River above Fort McPherson (1969-86)

The Spring Field Camps which were carried out in 1988 and 1989 indicate that there is significant BW effect from the Mackenzie Delta during and after break-up; this had not been considered in the original computations prior to 1987. In addition, HQ Curve No. 1, which was used from 1969 to 1979, was drawn too far to the right of later curves by about 20% at 10 m.

Revisions were made to 428 daily discharges from 1970 to 1986 (involving 29 months and 15 years) because of HW HQ curve revisions and/or revised BW interpretations during HW (mostly during break-up). Records for 1969-74 are incomplete.

Daily discharges for June 4 to 17, 1971, May 1 to June 9, 1974 and July 28 to August 25, 1974 (83 days) were deleted (inadequate base data). The maximum instantaneous discharges for 1975, 1977 and 1979 were deleted from the PEAKS file.

The minimum daily discharge of 41.9B m^3/s on April 12, 1973 was not previously published and is now the historical minimum for 1972-86 (not 45.9B m^3/s in 1972).

Revisions were made to 77 daily discharges for January 1 to 16, 1976 and November 1 to December 31, 1980 because of a "break in continuity".

The mean discharge for May 11, 1985 was revised by +18% from 82.5B to 97.0B m^3/s (computation error - "spike" on hydrograph).

A total of 589 daily discharges were revised, involving 37 months and 16 years (including the deletion of 83 daily discharges, involving 5 months and 2 years).

Summary of revisions to annual maximum daily discharges for:

1975: revised by -43% from 10600 to 6000E m^3/s
1976: revised by -9% from 4640 to 4220 m^3/s
1977: revised by -28% from 8380 to 6000E m^3/s
1978: revised by -23% from 7790B to 6000E m^3/s
1979: revised by -6% from 5220 to 4900E m^3/s
1980: revised by -21% from 8200B to 6500B m^3/s
1981: revised by -8% from 4900 to 4500E m^3/s
1982: revised by -24% from 9930 to 7500B m^3/s
1983: revised by -25% from 8000B to 6000B m^3/s
1984: revised by -26% from 6800B to 5000B m^3/s
1985: revised by -7% from 7000B to 6500B m^3/s
1986: revised by -6% from 5870B to 5500B m^3/s

5.3.13 10MC002 **Peel River (continued)**

Summary of significant revisions to monthly mean discharges:

May 1975: revised by -32% from 3230 to 2190 m^3/s
May 1976: revised by -7% from 2660 to 2470 m^3/s
May 1977: revised by -16% from 3340 to 2820 m^3/s
June 1978: revised by -11% from 3890 to 3470 m^3/s
May 1979: revised by -8% from 2370 to 2170 m^3/s
May 1980: revised by -21% from 3330 to 2420 m^3/s
Dec. 1980: revised by -44% from 180 to 100 m^3/s
May 1981: revised by +22% from 1380 to 1680 m^3/s
May 1982: revised by -20% from 1430 to 1150 m^3/s
May 1983: revised by -58% from 1760 to 735 m^3/s
May 1984: revised by -30% from 3090 to 2150 m^3/s
May 1985: revised by -7% from 2340 to 2170 m^3/s
May 1986: revised by -33% from 558 to 372 m^3/s

Summary of revisions to annual mean discharges:

1975: revised by -15% from 1040 to 883 m^3/s
1976: revised by -3% from 714 to 692 m^3/s
1977: revised by -7% from 760 to 706 m^3/s
1978: revised by -6% from 620 to 580 m^3/s
1979: revised by -3% from 870 to 852 m^3/s
1980: revised by -11% from 810 to 723 m^3/s
1981: revised by +4% from 662 to 688 m^3/s
1982: revised by -6% from 742 to 700 m^3/s
1983: revised by -17% from 655 to 541 m^3/s
1984: revised by -10% from 819 to 739 m^3/s
1985: revised by -3% from 699 to 679 m^3/s
1986: revised by -4% from 616 to 593 m^3/s

The mean annual discharge for 1975 to 1986 was revised by -7% from 751 to 698 m^3/s.

5.3.13 Peel River (continued)

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion, especially during break-up;

2. more measurements be obtained to define the stage-discharge relation more accurately, and especially during break-up to determine the extent of BW from the Mackenzie Delta;

3. a slope-stage-discharge relation and/or an area-velocity curve be developed and that daily water levels also be collected above the gauge and at Fort McPherson to obtain a better understanding of the river hydraulics at this station;

4. the daily gauge heights from 1969 to date be stored on the master LEVELS file at Ottawa; and

5. the data be reviewed again when a more reliable interpretation of the factors affecting HW flows can be made after more comprehensive field data have been collected.

5.3.14 10MC007 Rat River near Fort McPherson (1981-86)

Daily discharges for August 14 to 26, 1981 were revised (chart interpretation) and missing daily discharges for August 27 to October 14, 1981 were estimated to complete the year.

The maximum instantaneous discharge for 1981 was extracted from the STREAM output to replace the one previously published.

Two open-water discharge measurements which were made in 1982 (incomplete year) were added to the FLOW file.

Daily discharges for June 21 to September 21, 1983 were revised (chart interpretation) and those for September 22 to November 1, 1983 were revised to show a smooth winter recession.

Daily discharges for November 25, 1983 to January 30, 1984 were revised because of a "break in continuity".

Revisions were made to 263 daily discharges, involving 11 months and 3 years (this includes the completion of missing data for 47 days, involving 3 months and 1 year - 1981).

Summary of significant revisions to monthly mean discharges:

July 1983: revised by -5% from 8.99 to 8.55 m^3/s
Aug. 1983: revised by +12% from 7.05 to 7.87 m^3/s
Sept 1983: revised by +47% from 6.81 to 10.0 m^3/s
Oct. 1983: revised by +16% from 2.71 to 3.15 m^3/s
Dec. 1983: revised by -25% from 0.354 to 0.265 m^3/s
Jan. 1984: revised from 0 to 0.019 m^3/s

The mean discharge for 1981 was 13.0 m^3/s (not previously published). The mean discharge for 1983 was revised by +6% from 5.59 to 5.91 m^3/s. The mean discharge for 1984 was unchanged at 9.47 m^3/s. The mean annual discharge for 1981 to 1986 was revised by +15% from 7.50 to 8.66 m^3/s.

It is recommended that:

1. more discharge measurements be obtained to define the stage-discharge relation more accurately, especially at the extremes and during break-up;

2. the magnitude of the surge at various stages be documented; and

3. the elevation of zero flow be obtained at least annually.

5.3.15 10LC003 Rengleng River below Highway No. 8 (1972-86)

The daily discharges for April 5 to May 29, 1974 (55 days) were deleted (inadequate base data). The daily discharges for July 13 to August 6, 1974 (25 days) were revised to show a logarithmic recession instead of an arithmetic interpolation. The mean discharge for July was revised by -21% from 3.70 to 2.92 m^3/s.

The symbol A was added to 5 days (partial record) in 1974 and 1975 and to 17 days in 1986; and the symbol E to 91 days in 1975 (not previously identified as an estimated record).

The daily discharges for May 20 to June 3, 1976 (15 days) were revised (break-up interpretation). The maximum daily discharge was revised by +18% from 34.0 on August 17 to 40.0E m^3/s on May 30. The mean discharge May was revised by +56% from 5.75 to 8.98 m^3/s and for the year by +9% from 3.85 to 4.20 m^3/s.

The daily discharges for January 1 to December 31, 1977 were originally computed but inadvertently were not published. The 26 daily discharges during break-up (for May 21 to June 15) were revised in this Review because of a different interpretation and a revision to the HW range of the HQ relation. Daily discharges for December 15 to 31 were revised because of a "break in continuity". The mean discharge for May was revised by -29% from 19.3 to 13.7 m^3/s, for June by -22% from 27.6 to 21.6 m^3/s, for December by -3% from 0.313 to 0.305 m^3/s and for the year by -19% from 5.10 to 4.12 m^3/s. The maximum daily discharge was revised by -23% from 90.6 to 70.0E m^3/s.

The daily discharges for January 1 to 16, 1980 (16 days) were revised because of a "break in continuity". The daily discharges for May 24 to September 16 (116 days) were revised because of a different chart interpretation during break-up and because shift corrections were not applied. The maximum daily discharge was revised by -41% from 205 to 120E m^3/s. Mean discharges were revised as follows:

Jan. : from 0 to 0.024 m^3/s
May : by -26% from 36.2 to 26.7 m^3/s
June : by -25% from 39.4 to 29.7 m^3/s
July : by +21% from 2.30 to 2.78 m^3/s
Aug. : by +35% from 0.844 to 1.14 m^3/s
Sept.: by +11% from 0.857 to 0.954 m^3/s
1980 : by -23% from 6.74 to 5.21 m^3/s

The daily discharges for May 26 to October 20, 1982 were revised because of a different chart interpretation and to show a logarithmic recession instead of an arithmetic interpolation. The maximum daily discharge was revised by +15% from 59.3 to 68.0E m^3/s. Mean discharges were revised as follows:

May : by +42% from 5.92 to 8.39 m^3/s
June : by +20% from 23.1 to 27.7 m^3/s
July : by -77% from 15.6 to 3.57 m^3/s
Aug. : by -55% from 1.91 to 0.859 m^3/s
Sept.: by -2% from 0.699 to 0.683 m^3/s
Oct. : by +1% from 0.372 to 0.377 m^3/s
1982 : by -13% from 3.99 to 3.47 m^3/s

5.3.15 10LC003 Rengleng River (continued)

The maximum instantaneous discharges for 1978 and 1980 were deleted from the PEAKS file.

Revisions were made to 740 daily discharges, involving 30 months and 5 years - this includes the 55 daily discharges in 1974 which were deleted, involving 2 months; and the 365 daily discharges for 1977 which were not previously published.

The mean annual discharge for 1976-86 was revised by +4% from 2.68 to 2.80 m^3/s.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: High-water flows were mostly estimated and data should be used with discretion;

2. more discharge measurements be obtained to define the HQ relation and/or the daily shift/BW corrections more accurately; and

3. the elevation of zero flow be obtained at least annually and especially after HW flows.

5.3.16 10HB004 Silverberry River near Little Dal Lake (1980-86)

Daily discharges for September 11 to October 20, 1980 were revised because the wrong HQ Table was used (the STREAM program was re-run by Yellowknife and data were submitted to Ottawa). The mean discharge for October was revised by -48% from 10.1 to 5.30 m^3/s.

The 1981 data as originally computed were inadvertently not entered on the PEAKS or FLOW files and therefore were not published. Daily discharges for 1981 were submitted to Ottawa by Yellowknife using the STREAM program and will now be included in the master FLOW file (the PEAKS file was also updated).

The symbol A was added to 7 daily discharges for 2 years (partial chart record). The symbol E was added to 16 daily discharges above 140 m^3/s for 5 years and to the maximum instantaneous discharges for 1982 to 1985.

The mean annual discharge for 1981-86 was revised by -4% from 21.0 to 20.1 m^3/s, due to the inclusion of the 1981 data.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion;

2. (a) more discharge measurements be obtained to define the stage-discharge relation and/or the daily shift correction distribution more accurately;
   (b) the magnitude of the WL surging at the orifice be documented; and
   (c) the elevation of zero flow be obtained at least annually;

3. the symbol E be added to all discharges above 140 m^3/s subsequent to 1986 (FLOW and PEAKS files); and

4. records be reviewed again when high-water measurements above 140 m^3/s have been obtained and revised if appropriate.

5.3.17 10JE001 **Sloan River near the Mouth** (1976-86)

Daily discharges for May 25 to June 18, 1978 (25 days) were revised (including the estimation of missing daily discharges for June 1 to 10) - BW and chart interpretation.

Missing daily discharges for January 1 to May 10, 1981 (130 days) were estimated to complete the records for the year. **Daily discharges** for May 11 to 23 were revised (BW interpretation).

The **symbol E** was added to June 8 to July 7 and A to July 8, 1983 - HW range of HQ relation is not defined and chart interpretation is debatable. The symbol E was also added to the maximum instantaneous discharge for 1983.

The **mean annual discharge** for 1976-86 was revised by -2% from 13.7 to 13.4 m^3/s. The annual mean for 1978 was 8.02 m^3/s and for 1981, 16.4 m^3/s - both "not previously published".

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: **The high-water flows are not well-defined and data should be used with discretion;**

2. **more discharge measurements** be obtained at the extremes and during winter and break-up periods;

3. **the elevation of zero flow** be obtained annually; and

4. **the determination of zero flow** be fully documented, e.g., number of holes drilled and where, whether there is any water present, etc.

5.3.18 10ND002 Trail Valley Creek near Inuvik (1977-86)

The maximum instantaneous discharge for 1986 was deleted from the PEAKS file.

No revisions were made to daily discharges.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The data barely meet National Standards and should be used with discretion;

2. more discharge measurements be obtained to define the stage-discharge relation more accurately;

3. the elevation of zero flow be obtained at least annually to define the LW range of the HQ relation more accurately; and

4. the Standard Period be changed from "May to December" to "All Year" to facilitate the comparison of annual data with other stations.

5.3.19 10HA003 Twitya River near the Mouth (1980-86)

The maximum instantaneous discharge as published for 1978 does not apply to this station and therefore was deleted from the PEAKS file.

The 1981 data as originally computed for January 1 to July 7, August 14, and September 23 to December 31 were inadvertently not entered on the PEAKS or FLOW files and therefore were not published. In this Review, open-water discharges were revised because of a revision to the HQ curve (HW discharge measurement was discarded); and the missing daily discharges for July 8 to August 13 and August 15 to September 22 were estimated by hydrograph comparison to complete the records for 1981. The mean discharge for May was revised by +25% from 101 to 126 m^3/s and for June by +21% from 119 to 144 m^3/s. The maximum daily discharge on May 27 was revised by +30% from 237 to 308 m^3/s. The maximum instantaneous discharge was extracted as 341 m^3/s on May 27 (not previously published).

The daily discharges for May 16 to October 15, 1982 were revised because of a revision to the HQ curve. The mean discharge for May was revised by +23% from 67.1 to 82.6 m^3/s, for June by +31% from 220 to 289 m^3/s and for 1982 by +14% from 58.6 to 66.8 m^3/s. The maximum daily discharge on June 12 was revised by +43% from 350 to 501E m^3/s and the maximum instantaneous discharge by +47% from 377 to 556E m^3/s.

The missing daily discharges for May 17 to June 11 and June 14 to 30, 1984 were estimated by hydrograph comparison to complete the records for the year.

The symbol A was added to 14 daily discharges for 3 years. The symbol B was added to 3 daily discharges in 1980. The symbol E was added to 5 daily discharges above 500 m^3/s for 3 years and to maximum instantaneous discharges for 4 years, including 1987 (PEAKS file).

A total of 561 daily discharges were revised, involving 20 months and 3 years. This includes data not previously published (365 days in 1981 and 43 days in 1984), involving 5 months and 2 years. The mean annual discharge for 1981-86 was revised by -1% from 62.3 to 61.8 m^3/s.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion;

2. (a) more discharge measurements be obtained to define the stage-discharge relation and/or the daily shift correction distribution more accurately;
   (b) the magnitude of the WL surging at the orifice be documented; and
   (c) the elevation of zero flow be obtained annually;

3. the symbol E be added to all discharges above 500 m^3/s subsequent to 1986 (FLOW and PEAKS files); and

4. records be reviewed again when high-water measurements above 500 m^3/s have been obtained and revised if appropriate.

5.3.20 10LA004 Weldon Creek near the Mouth (1977-86)

Missing daily discharges for June 5 to 25 and June 28 to July 18, 1978 (42 days) were estimated to give a complete block of data from 1978 to date. Daily discharges for June 4 and 26-27, 1978 were revised because of a stage-discharge curve revision.

Daily discharges for June 18 to 28 and August 9 to September 29, 1981 were revised (63 days) because of a different chart interpretation. The mean discharge for June was revised by -2% from 11.1 to 10.9 m^3/s, for August by -18% from 3.06 to 2.63 m^3/s, for September by -14% from 2.91 to 2.50 m^3/s.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion;

2. the Standard Period be changed from "May to October" to "All Year" to facilitate the comparison of annual data with other stations;

3. more discharge measurements be obtained to define the stage-discharge relation and/or the daily or BW/shift correction distribution more accurately; and

4. the elevation of zero flow be obtained at least annually and especially after high-water periods.

5.3.21 10JD002 Whitefish River near the Mouth (1977-86)

Revisions were made to 800 daily discharges involving 32 months and 6 years. This includes the estimation of 130 missing daily discharges, involving 5 months for 1 year (1981).

The most significant revisions were made as follows:

(a) zero flow was revised to show some flow during winter periods for 5 years (1980, 1982, 1984, 1985 and 1986)
(b) BW interpretation for October 3 to December 31, 1981
- mean discharge for October was revised by +77% from 2.84 to 5.03 m^3/s and for December by -60% from 1.39 to 0.556 m^3/s
(c) "break in continuity" for 2 periods (1981-82 and 1986-87)
- mean discharge for January 1982 was revised from zero flow to 0.081 m^3/s
- mean discharge for December 1986 was revised by -45% from 0.631 to 0.348 m^3/s

Summary of revisions to daily discharges:

1980: February 14 to April 25 and November 2 to December 31 (132 days)
: zero flow revised to show some flow and smoother winter recession
1981: January 1 to May 13 and October 3 to December 31 (223 days)
: January 1 to May 10 were estimated to complete the year and May 11 to 13 were revised (BW interpretation); October 3 to December 31 (BW interpretation and "break in continuity")
1982: January 1 to May 11 and June 29 to July 16 (149 days)
: "break in continuity" from December 1981 to January 1982 (also, zero flow revised to show some flow)
: June 29 to July 16 were revised from a straight-line interpolation to a logarithmic recession
: the symbol A or E was added to July 17 to September 22 (68 days)
1984: February 7 to April 30 (84 days)
: zero flow revised to show some flow
1985: February 11 to April 26 (75 days)
: zero flow revised to show some flow
1986: February 6 to May 12 and November 21 to December 31 (137 days)
: zero flow revised to show some flow (February to May) and "break in continuity" (November to December)

It is recommended that:

1. more discharge measurements be obtained during break-up and HW periods and also during open-water periods to define the daily shift correction distribution more accurately;

2. any observation of zero flow during winter periods be fully documented, e.g., number of holes drilled, if any water found, etc.; and also that the location of the winter measurement section be physically identified during the last visit at open-water; and

3. the elevation of zero flow be obtained at least annually to define the shape of the HQ curve in the LW range more accurately.

5.3.22 10ND003 Zed Creek near Inuvik (1978-82)

No revisions were made.

It is recommended that:

1. the following note be added under Remarks in the next Historical Streamflow Summary publication: The stage-discharge relation is not well-defined and data should be used with discretion; and

2. the Station Description be updated to agree with the HYDEX File.

6. DATA REVIEW PROCEDURES

6.1 **General Procedures**: from WRB Manual of Hydrometric Data Review Procedures (Fifth Edition, 1980).

(a) Obtain appropriate comparison hydrographs and listings from the master data files at Ottawa (HYDEX, FLOW AND PEAKS);
(b) Obtain appropriate historical climate data (daily maximum and minimum air temperatures and daily precipitation) from Yellowknife;
(c) Assemble all available basic field and office data for the station(s) under review, including STREAM output if required;
(d) Prepare Station History;
(e) Convert gauge heights and discharges on List of Measurements form from imperial to metric units and vice versa (data have been collected and computed in metric units since 1979-80);
(f) Prepare Composite Curve Sheets - imperial and metric - tabulate period of use, and annual range of stage (usually during open-water periods only);
(g) Plot climate data on comparison hydrographs (to be used as worksheets);
(h) Plot discharge measurements (metric units) on hydrograph worksheets;
(i) Plot date of beginning and end of ice conditions (B) and estimated periods (E), and period of gauge height records on hydrograph worksheets;
(j) Examine data year by year, especially peaks - compare with other stations - spot check daily values, including recorder charts;
(k) Discuss proposed revisions (including deletions or extensions) with Yellowknife;
(l) Extend, delete and/or revise data - prepare PEAKS and/or FLOW file update forms;
(m) Arrange to have temporary PEAKS and FLOW files set up at Ottawa;
(n) Submit PEAKS and FLOW updates to Ottawa; HYDEX master file updates to be submitted to Ottawa by Yellowknife;
(o) Check plots and listings from updated temporary data files;
(p) Prepare Review Report;
(q) Some of the items mentioned above may be carried out concurrently or in a different order;
(r) Final approval by Yellowknife - HYDEX file to be updated by Yellowknife;
(s) Yellowknife to advise Ottawa of approval of Review Reports;
(t) Master PEAKS and FLOW files updated by Ottawa using latest PEAKS, FLOW and HYDEX file updates;
(u) Revised historical daily discharge listings will be sent automatically to Yellowknife by Ottawa;
(v) Historical listings to be verified by Yellowknife to ensure that all revisions have been included;
(w) Original documents to be identified by Yellowknife that revisions have been made to ensure that users are supplied with up-to-date data;
(x) Review Report should be filed in the Revisions File and any previous or subsequent revisions fully documented on a "Data Review History" sheet;
(y) Revisions will be published by Ottawa in the next Historical Sreamflow Summary publication; and
(z) Sub-offices should be advised of any revisions that have been made.

Note: Revisions will be required to Sediment Data where applicable

6.2 Factors Affecting Review Process

(a) **Description File** is incomplete
- latest Station Description is now usually up-to-date
- chronological documentation of changes in Station History is incomplete or missing (no field reports), e.g., installation changes (shelters, cable carrier systems, BMs), location changes, BM stability (permafrost), DCPs, etc.
- latest drainage area and map co-ordinates appear up-to-date but date of digitizing and scale of map are not given on summary sheet
- more photographs needed

(b) **Work Files** prior to late seventies are incomplete or missing and existing files are not easy to access (have to be taken apart to look at data)
- Station Analysis usually available but usually incomplete, e.g., basis for estimates not given, reason for missing gauge heights or why measurements are discarded not given
- distribution of daily shift corrections, BW interpretation and winter work sheets not included
- STREAM output is available from SAVE file but is time-consuming
- DCP readings are not tabulated

(c) **Major hydrologic events** are not documented
- e.g., floods and HW marks (flood reports)
- slope-area computations or reports not available
- break-up activity, freeze-up (and "recovery")

(d) Data have been collected and computed in **metric units** since 1979-80
- data often have to be converted from imperial to metric and vice versa (gauge heights and discharges on List of Measurements, HQ tables, daily gauge heights and daily discharges)

(e) Continuous graphical **gauge height records** usually obtained during open-water periods only and usually no observer
- records often incomplete during break-up, especially at peaks (landings often impossible because fixed-wing aircraft were used prior to about 1980 - no documentation on this, especially on river conditions) - most stilling well (float) installations have been replaced by servomanometer systems mainly because of frozen intake problems
- Winnipeg-type pressure gauge also being replaced by servomanometer mainly because of recorder malfunction and chart interpretation problems (small scale, reversals, "painting", setting WL accurately on chart)
- servomanometer problems related to orifice line, mechanical or electrical malfunctions, gas leakage, mercury blown, accuracy of setting WL readings on chart
- some chart interpretations debatable, e.g., accuracy of setting WL on chart (large pen corrections), reversals, surging, orifice movement, orifice settling corrections; quality checks of digitizing not shown on each chart segment
- "multiple-file" folders a good idea for storing recorder charts

6.2 **Factors Affecting Review Process** (continued)

(f) **Stage-discharge relation** in early years usually not well-defined (insufficient measurements), especially at extremes; although this has improved for some stations in recent years
- BW effect during break-up not well-defined by discharge measurements
- shift corrections not well-defined for unstable controls; shift corrections usually distributed on a straight-line basis (tabulations of these corrections usually not available, except from SAVE file subsequent to 1975)
- period of use usually not stated on HQ curve sheets and tables, although this is usually shown on Station Analysis

(g) Accuracy of **winter measurements** is debatable at times because of very cold weather and slush ice conditions
- usually not enough measurements during winter periods, even in recent years

(h) **Basis for Revisions and Estimates:**
- difficult to estimate in advance, the time required to complete revisions or missing periods
- bracketted means (which were used before mid-sixties) were changed to daily discharges from hydrographs
- **comparison hydrographs** were used extensively but are not to the same scale as WRB forms, therefore time-consuming when plotting measurements and comparing hydrographs
- high water marks
- new interpretation of BW effect and shift corrections
- shape, timing and magnitude of flows during break-up
- logarithmic recession (not arithmetic interpolation) during winter and estimated periods
- new interpretation of HQ curves based on more recent data, however, still insufficient measurements to fully substantiate revisions in some cases
- recent **Spring Field Surveys** invaluable (more should be carried out)

(i) **Operational Constraints**
- computer software inadequate, especially for comparison hydrographs and basin review
- shortage of funds for field trips (discharge measurements) and instrumentation
- shortage of staff (trained technicians) to carry out data reviews